

REMARKS/ARGUMENTS

After the foregoing Amendment, Claims 1-10 are currently pending in this application. Claims 4 and 5 have been amended to correct claim dependency.

Claim Objections

The Examiner objected to claims 4 and 5 for having claim dependency errors. Claims 4 and 5 are amended to reflect dependency on claims 2 and 4, respectively. The withdrawal of the objection to the claims 4-5 is respectfully requested.

Claim Rejections - 35 USC § 102

Claims 1-4 and 6-10 stand rejected under 35 USC 102 as being anticipated by U.S. Patent No. 6,862,271 (Medvedev et al.).

The present invention pertains to radio communication techniques between communication devices, where signals are transmit beamformed from a plurality of antennas at one communication device to another communication device. When processing signals for transmission, a baseband signal for transmission is weighted by a plurality of transmit antenna weights, each weight associated with a corresponding antenna, to produce a plurality of transmit signals for simultaneous transmission from corresponding ones of the plurality of antennas. As recited in independent claims 1 and 6, the transmit antenna weights are computed subject to

two constraints referred to in the specification of the present application as the equal power (equal gain) constraint and the frequency shaping constraint. See page 5 line 5 through page 6 line 16 in the specification for the corresponding support and description of these constraints, as well as Fig. 2 and 3 and their corresponding descriptions.

With respect to the equal power constraint, each of these claims recites that the transmit antenna weights are computed such that when applied to the baseband signal, the power to be output at each antenna is the same and is equal to the total power to be output by the plurality of antennas divided by the number of antennas. The frequency shaping constraint involves computing the transmit antenna weights such that when applied to the baseband signal, the sum of the power at each corresponding frequency across the N transmit signals is equal to a constant. The frequency shaping constraint is described in claims 2 and 3.

Fig. 2 of the present application shows a situation where the frequency shaping constraint is applied to a two-antenna path device ($N=2$) for weighted signals (i.e., transmit signals) at baseband that can be described as having a bandwidth spanned by K frequency sub-bands. The frequency shaping constraint says that the sum of the power at each corresponding frequency across the plurality of transmit signals (i.e., signal for transmission from antenna 1 and signal from transmission from antenna 2) is equal to a constant. That is, the sum of the power

at frequency k for the signal to be transmitted at antenna 1 plus the power at frequency k for the signal to be transmitted at antenna 2 is the same as the sum of the power at frequency $k+1$ for the signal to be transmitted at antenna 1 plus the power at frequency $k+1$ for the signal to be transmitted at antenna 2, etc., which is equal to a constant.

Regarding claims 1-4, and 6-10, Medvedev discloses a MIMO system with multiple transmission modes. Based on a determination of system conditions, such as SNR, a transmission mode is selected from among several available modes. One of these modes is a beam-steering transmission scheme (col. 10 line 43, to col. 11 line 18) in which a total transmit power is allocated uniformly to all transmit antennas. The Examiner has correlated this technique disclosed by Medvedev as having anticipated the claimed frequency shaping constraint “such that the sum of the power at each corresponding frequency across the plurality of transmit signals is equal to a constant.” The Applicant respectfully disagrees. The beam-steering technique described in Medvedev does not suggest or teach the frequency shaping constraint as claimed and shown in Fig. 2 of the present invention. Nor do any of the other techniques (i.e., water-filling, selective channel inversion, uniform transmission scheme, beam-forming) disclosed in Medvedev correspond to the claimed frequency shaping constraint.

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Claims 2-4 and 7-10 are dependent upon claims 1 and 6, which the Applicants believe are allowable over the cited prior art of record for the same reasons provided above.

Based on the arguments presented above, withdrawal of the 35 USC 102 rejection of claims 1-4 and 6-10 is respectfully requested.

Claim Rejections - 35 USC § 103

Claim 5 stands rejected under 35 USC 103 as being unpatentable over Medvedev. Claim 5 is dependent upon claim 1, which the Applicants believe is allowable over the cited prior art of record for the same reasons provided above.

Based on this, withdrawal of the 35 USC 103 rejection of claim 5.

Conclusion


If the Examiner believes that any additional minor formal matters need to be addressed in order to place this application in condition for allowance, or that a telephone interview will help to materially advance the prosecution of this application, the Examiner is invited to contact the undersigned by telephone at the Examiner's convenience.

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In view of the foregoing amendment and remarks, Applicants respectfully submit that the present application, including claims 1 - 10, is in condition for allowance and a notice to that effect is respectfully requested.

Respectfully submitted,

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Enclosure